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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/645,903	08/25/2000	Li Li	3361.2US (97-663.2)	6825
24247	7590	03/01/2006	EXAMINER	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			GUERRERO, MARIA F	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 03/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 09/645,903	Applicant(s) LI, LI	
	Examiner Maria Guerrero	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is in response to the Amendment filed December 7, 2005.

Status of Claims

2. Claims 1-9 are canceled. Claims 10-31 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant admitted prior art in view of Suzuki (US 4,080,619) (of record).

Applicant admitted prior art teaches providing a semiconductor substrate (202) having a conductive pad or metal trace (204) (aluminum, aluminum alloys, titanium, titanium alloy, or molybdenum), forming a barrier layer (206), and forming a dielectric layer (208) having an underlying metal-containing layer (Fig. 11-14, page 3). Applicant admitted prior art shows the dielectric layer (208) having an underlying metal-containing layer and a contact opening (Fig. 11-14). Applicant admitted prior art describes forming a first via portion having substantially parallel sidewalls through anisotropic etching of the dielectric layer (pages 2-4). Applicant admitted prior art discloses forming an oxide polymer residue with the first via portion (pages 3-4). Applicant admitted prior art shows forming a second via portion having substantially parallel sidewalls through the portion

of the barrier layer by anisotropic etching (Fig. 12-14). Applicant admitted prior art describes forming a metal polymer residue within the first and second via portions and applying a phosphoric acid containing solution to remove the residues from the contact opening (Fig. 12-14, pages 2-4).

Applicant admitted prior art does not specifically show applying the nitric acid dip. However, Suzuki teaches discloses applying a nitric acid dip followed by a phosphoric dip as conventional in the art (col. 4, lines 50-60).

Regarding the specific concentration, time, and temperature claimed, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to select the concentration merely by following the teachings of the references because there is not evidence of criticality. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003)(“The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (“Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.”); In re Aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955)(“Where the general conditions of a claim are discloses in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”)

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the use of the nitric acid solution on Applicant

admitted prior art as taught by Suzuki in order to remove any remaining layer without damaging the structure.

4. Claims 10-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant admitted prior art in view of Yamada Osamu (JP 05-041485).

Applicant admitted prior art teaches providing a semiconductor substrate (202) having a conductive pad or metal trace (204) (aluminum, aluminum alloys, titanium, titanium alloy, or molybdenum), forming a barrier layer (206), and forming a dielectric layer (208) (Fig. 11-14, page 3). Applicant admitted prior art discloses the dielectric layer (208) having an underlying metal-containing layer and a contact opening (Fig. 11-14). Applicant admitted prior art describes forming a first via portion having substantially parallel sidewalls through anisotropic etching of the dielectric layer (pages 2-4). Applicant admitted prior art discloses forming an oxide polymer residue with the first via portion (pages 3-4). Applicant admitted prior art shows forming a second via portion having substantially parallel sidewalls through the portion of the barrier layer by anisotropic etching (Fig. 12-14). Applicant admitted prior art describes forming a metal polymer residue within the first and second via portions and applying a phosphoric acid containing solution to remove the residues from the contact opening (Fig. 12-14, pages 2-4).

Applicant admitted prior art fails to show applying a nitric acid dip and using the fluoride-containing compound. However, Yamada Osamu discloses applying a nitric acid or phosphoric acid, employing HF buffer liquid (HF + ammonium fluoride), followed by a nitric acid dip (Abstract, Example, paragraph 0010-0013).

Regarding the specific concentration, time, and temperature claimed, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to select the concentration merely by following the teachings of the references because there is not evidence of criticality. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003)(“The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (“Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.”); In re Aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955)(“Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”)

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the fluorine containing solution and the nitric acid containing solution on Applicant admitted prior art as taught by Yamada Osamu in order to improve the reliability of the device (Yamada Osamu, Abstract).

Terminal Disclaimer

5. The terminal disclaimer filed on December 7, 2005 disclaiming the terminal portion of any patent granted on this application which would extend beyond the

expiration date of US Patent No. 6,576,547 B2 has been reviewed and is accepted.
The terminal disclaimer has been recorded.

6. The terminal disclaimer filed on December 7, 2005 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US Patent No. 6,828,228 B2 has been reviewed and is accepted.
The terminal disclaimer has been recorded.

Response to Arguments

7. Applicant's arguments filed December 7, 2005 have been fully considered but they are not persuasive. Claims 10-31 stand rejected because the amendment does not overcome the 35 USC 103 Rejections. However, the Double Patenting Rejections and the 35 USC 102 Rejections are withdrawn.

8. Applicant argued that Suzuki in view of the prior art fails to teach or suggest every element of claim 10 of the presently claimed invention. However, the Obviousness Rejection is based on Applicant admitted prior art in view of Suzuki. Applicant argued that Suzuki fails to teach or suggest removing oxide polymer and metal from a contact opening in a dielectric layer having an underlying metal-containing layer on a semiconductor substrate, the method comprising performing a nitric acid solution dip on the contact opening followed by a phosphoric acid opening solution dip. However, Applicant admitted prior art teaches a dielectric layer (208) having an underlying metal-containing layer (Fig. 11-14). Applicant admitted prior art discloses forming an oxide polymer residue with the first via portion (pages 3-4). Applicant

admitted prior art describes forming a metal polymer residue within the first and second via portions and applying a phosphoric acid containing solution to remove the residues (Fig. 12-14, pages 2-4). Applicant admitted prior art does not specifically show applying the nitric acid dip. However, Suzuki is presented as evidence to show that applying a nitric acid dip followed by a phosphoric dip is well known in the art (col. 4, lines 50-60).

9. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the use of the nitric acid solution on Applicant admitted prior art as taught by Suzuki in order to remove any remaining layer without damaging the structure. And it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the fluorine containing solution and the nitric acid containing solution on Applicant admitted prior art as taught by Yamada Osamu in order to improve the reliability of the device (Yamada Osamu, Abstract).

10. Applicant argued that Osamu fails to teach or suggest removing oxide polymer and metal from a contact opening in a dielectric layer having an underlying metal-containing layer on a semiconductor substrate, the method comprising performing a

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nitric acid solution dip on the contact opening followed by a phosphoric acid opening solution dip. However, Applicant admitted prior art teaches a dielectric layer (208) having an underlying metal-containing layer and a contact opening (Fig. 11-14). Applicant admitted prior art discloses forming an oxide polymer residue with the first via portion (pages 3-4). Applicant admitted prior art describes forming a metal polymer residue within the first and second via portions and applying a phosphoric acid containing solution to remove the residues (Fig. 12-14, pages 2-4). Applicant admitted prior art fails to show applying a nitric acid dip and using the fluoride-containing compound. However, Yamada Osamu is presented as evidence to show that applying a nitric acid or phosphoric acid, employing HF buffer liquid (HF + ammonium fluoride), followed by a nitric acid dip is well known in the art (Abstract, Example, paragraph 0010-0013).

11. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

12. Furthermore, the elements must be arranged as required by the claim, but this is not an ipsissimis verbis test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

13. In addition, during examination, the claims must be interpreted as broadly as their terms reasonably allow. > *In re American Academy of Science Tech Center*, F.3d,

2004 WL 1067528 (Fed. Cir. May 13, 2004)(The USPTO uses a different standard for construing claims than that used by district courts; during examination the USPTO must give claims their broadest reasonable interpretation.) < This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) >; Chef America, Inc. v. Lamb-Weston, Inc., 358 F.3d 1371, 1372, 69 USPQ2d 1857 (Fed. Cir. 2004). Therefore, words in the claims have been given their plain meaning because applicant has failed to provide any special definition in the specification.

14. Furthermore, "the use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." In re Heck, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting In re Lemelson, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir.1998).

15. Finally, the transitional term "comprising", which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See, e.g., > Invitrogen Corp. v. Biocrest

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Mfg., L.P., 327 F.3d 1364, 1368, 66 USPQ2d 1631, 1634 (Fed. Cir. 2003) ("The transition comprising' in a method claim indicates that the claim is open-ended and allows for additional steps."); < Genentech, Inc. v. Chiron Corp., 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997) ("Comprising" is a term of art used in claim language which means that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim.); Moleculon Research Corp. v. CBS, Inc., 793 F.2d 1261, 229 USPQ 805 (Fed. Cir. 1986); In re Baxter, 656 F.2d 679, 686, 210 USPQ 795, 803 (CCPA 1981); Ex parte Davis, 80 USPQ 448, 450 (Bd. App. 1948) ("comprising" leaves "the claim open for the inclusion of unspecified ingredients even in major amounts").

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

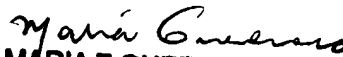
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837. The examiner can normally be reached on M-F (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

February 9, 2006


MARIA F. GUERRERO
PRIMARY EXAMINER